



## Ocean Quahog Fishery Information Document

April 2021

This Fishery Information Document provides a brief overview of the biology, stock condition, management system, and fishery performance for ocean quahog with an emphasis on 2021. Data sources for Fishery Information Documents are generally from unpublished National Marine Fisheries Service (NMFS) survey, dealer, vessel logbook, and permit databases and should be considered preliminary. For more resources, including previous Fishery Information Documents, please visit <http://www.mafmc.org/surfclams-quahogs>.

### Key Facts

- There has been no change to the status of the ocean quahog stock. The stock was not overfished and overfishing was not occurring in 2019.
- The total ex-vessel value of the 2021 federal harvest was approximately \$18 million, higher than the \$16 million in 2020.
- In 2020, there were 8 companies reporting purchases of surfclam and/or ocean quahog in 5 states outside of Maine.
- The fishery appears to continue to shift its effort Northward, and has shown increased effort in the Southern New England and Georges Bank area in recent years.

### Basic Biology

Information on ocean quahog biology can be found in the document titled, “Essential Fish Habitat Source Document: Ocean Quahog, *Arctica islandica*, Life History and Habitat Requirements” (Cargnelli et al. 1999).<sup>1</sup> An electronic version is available at the following website: <https://www.fisheries.noaa.gov/new-england-mid-atlantic/habitat-conservation/essential-fish-habitat-efh-northeast>. Additional information on this species is available at the following website: <https://www.fishwatch.gov/>. A summary of the basic biology is provided below.

The ocean quahog is a bivalve mollusk distributed in temperate and boreal waters on both sides of the North Atlantic Ocean. In the Northeast Atlantic, quahog occur from Newfoundland to Cape Hatteras from depths of about 8 to 400 meters (26 to 1,312 ft). Ocean quahog further north occur closer to shore. The US stock resource is almost entirely within the Exclusive Economic Zone (EEZ; 3-200 miles from shore), outside of state waters, and at depths between 20 and 80 meters (66 and 262 ft). However, in the northern range, ocean quahog inhabit waters closer to shore, such that the state of Maine has a small commercial fishery which includes beds within the state's territorial sea ( $\leq 3$  miles). Ocean quahog burrow in a variety of substrates and are often associated with fine sand.

Ocean quahog are one of the longest-living, slowest growing marine bivalves in the world. Under normal circumstances, they live to more than 100 years old. Ocean quahog have been aged well in excess of 200 years. Growth tends to slow after age 20, which corresponds to the size currently harvested by the industry (approximately 3 inches). Size and age at sexual maturity are variable and poorly known. Studies in Icelandic waters indicate that 10, 50, and 90 percent of female ocean quahog were sexually mature at 40, 64 and 88 mm (1.5, 2.5 and 3.5 inches) shell length or approximately 2, 19 and 61 years of age. Spawning occurs over a protracted interval from summer through autumn. Free-floating larvae may drift far from their spawning location because they develop slowly and are planktonic for more than 30 days before settling. Major recruitment events appear to be separated by periods of decades.

Based on their growth, longevity and recruitment patterns, ocean quahog are relatively unproductive and able to support only low levels of fishing. The current resource consists of individuals that accumulated over many decades.

Ocean quahog are suspension feeders on phytoplankton and use siphons which are extended above the surface of the substrate to pump in water. Predators of ocean quahog include certain species of crabs, sea stars, and other crustaceans, as well as fish species such as sculpins, ocean pout, cod, and haddock.

## **Status of the Stock**

The most current assessment of the ocean quahog (*Arctica islandica*) stock is a management track assessment of the existing 2017 benchmark Stock Synthesis (SS) assessment (SAW 63; NEFSC 2017).<sup>2,3</sup> Based on the previous assessment the stock was not overfished, and overfishing was not occurring. The management track assessment updates commercial fishery catch data, and commercial length composition data, as well as the analytical SS assessment model and reference points through 2019. No new survey data have been collected since the last assessment. Stock projections have been updated through 2026.

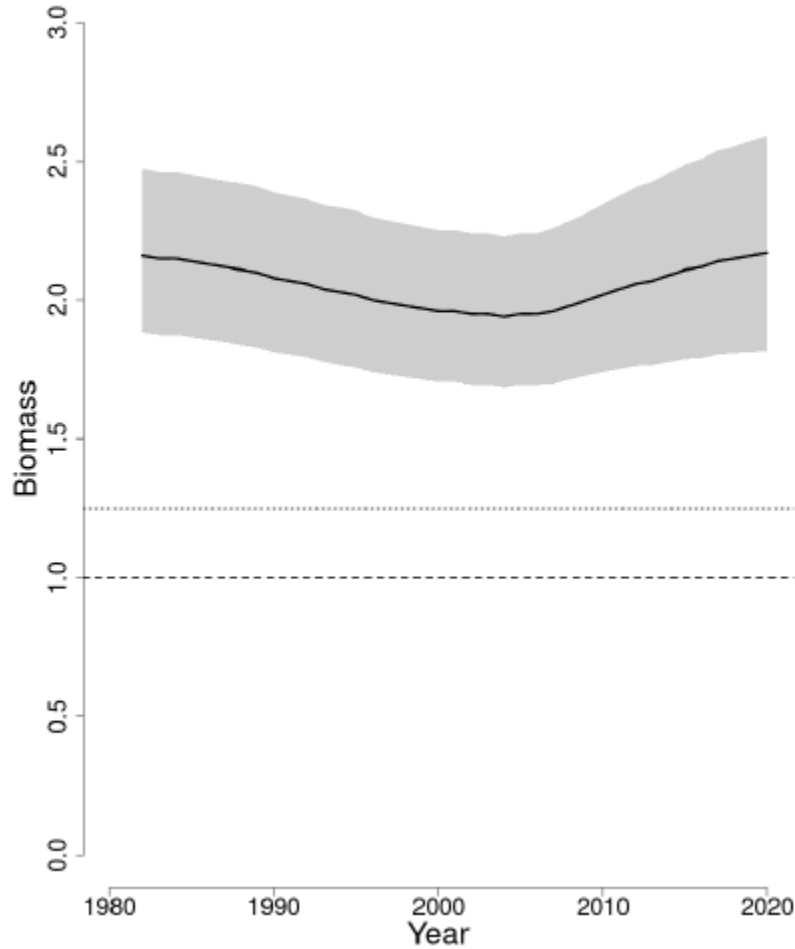
Based on this updated assessment, the ocean quahog stock is not overfished and overfishing is not occurring (Figures 1-2). Retrospective adjustments were not made to the model results. Spawning stock biomass (SSB) in 2019 was estimated to be 3,651 ('000 mt) which is 172.8% of the biomass target ( $SSB_{MSY\ proxy} = 2,113$ ; Figure 1). The 2019 fully selected fishing mortality was estimated to be 0.005 which is 25.5% of the overfishing threshold proxy ( $F_{MSY\ proxy} = 0.019$ ; Figure 2).

## **Management System and Fishery Performance**

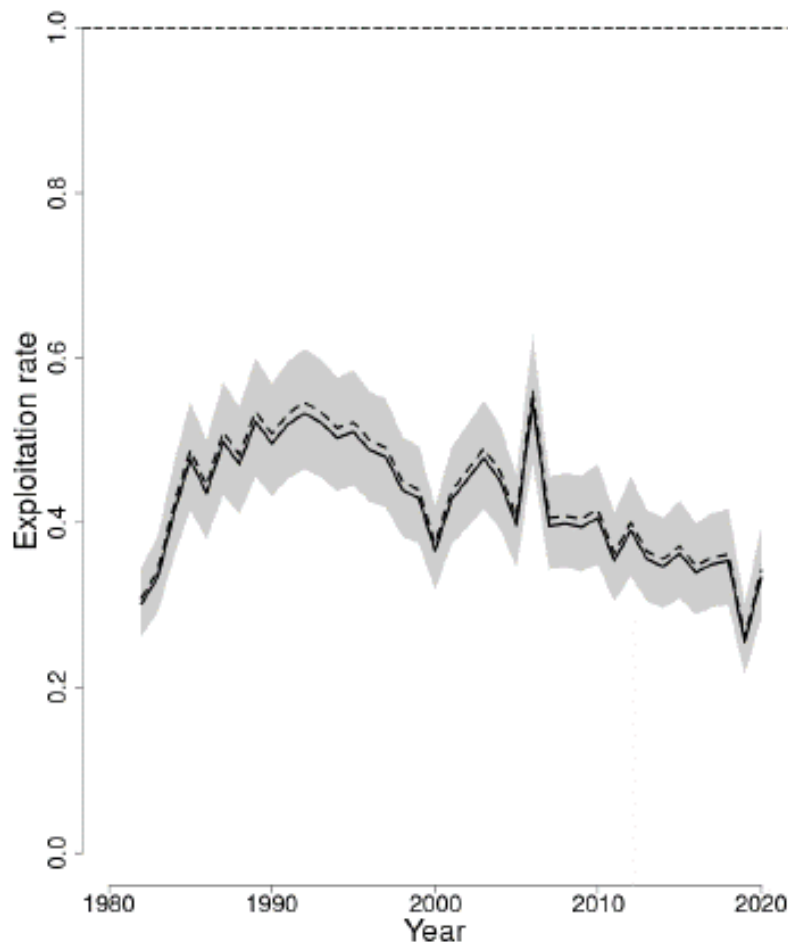
### *Management*

The Fishery Management Plan (FMP) for ocean quahog (*Arctica islandica*) became effective in 1977. The FMP established the management unit as all ocean quahog in the EEZ. The FMP is managed by the Mid-Atlantic Fishery Management Council (Council), in conjunction with NMFS as the Federal implementation and enforcement entity. The primary management tool is the specification of an annual quota, which is allocated to the holders of allocation shares (Individual Transferable Quotas - ITQs) at the beginning of each calendar year as specified in Amendment 8 to the FMP (1988). In addition to the Federal waters fishery, there is a small

fishery prosecuted in the state waters of Maine. The FMP, including subsequent Amendments and Frameworks, are available on the Council website at: <http://www.mafmc.org>.



**Figure 1. Trends in spawning stock biomass of ocean quahog between 1982 and 2020 from the current (solid line) and previous (dashed line) assessment and the corresponding  $SSB_{Threshold}$  (horizontal dashed line) as well as  $SSB_{Target}$  ( $SSB_{MSY}$  proxy; horizontal dotted line) based on the 2020 assessment. Units of SSB are the ratio of annual biomass to the biomass threshold ( $SSB/SSB_{Threshold}$ ). The approximate 90% lognormal confidence intervals are shown.<sup>3</sup>**



**Figure 2. Trends in the fully selected fishing mortality ( $F_{Full}$ ) of ocean quahog between 1982 and 2020 from the current (solid line) and previous (dashed line) assessment and the corresponding  $F_{Threshold}$  ( $F_{MSY\ proxy}=0.019$ ; horizontal dashed line), based on the 2020 assessment. Units of fishing mortality are the ratio of annual  $F$  to the  $F$  threshold ( $F/F_{Threshold}$ ). The approximate 90% lognormal confidence intervals are shown.<sup>3</sup>**

### *Commercial Fishery*

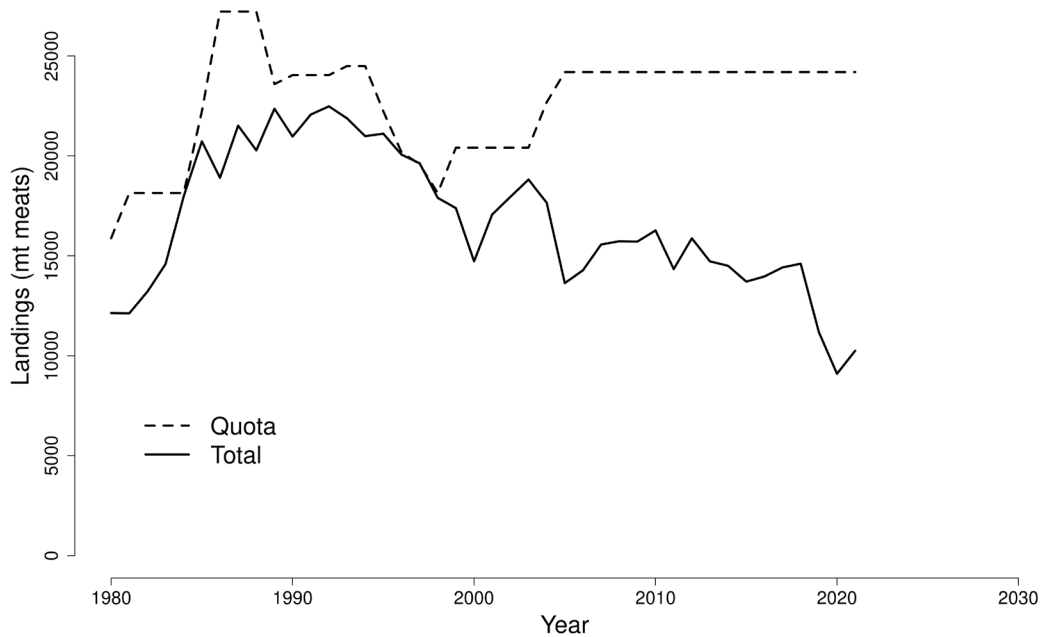
The commercial fishery for ocean quahog in Federal waters is prosecuted with large vessels and hydraulic dredges and is very different from the small Maine fishery prosecuted with small vessels (35-45 ft) targeting quahog for the local fresh, half shell market. Ocean quahog landings and commercial quotas are given below in Table 1 and Figure 3. In 2020, COVID-19 impacted the fishing sector - information on those impacts can be found here and in recent fishery performance reports: <https://media.fisheries.noaa.gov/2021-02/Northeast-COVID-19-Impact-Snapshot-webready.pdf>.

The areas where ocean quahog are found is shown in Figure 4. The distribution of the fishery has changed over time (Figures 5-8). The bulk of the fishery from 1980-1990 was being prosecuted off the Delmarva but is now being prosecuted in more Northern areas. Figure 9 provides the distribution of ocean quahog landings in “important” ten minute squares (TMSQ). Important means that a square ranked in the top 10 TMSQ for total landings during any five-year period (1980-1984, 1985-1989, ...). Data for 2021 are incomplete and preliminary, and included in the last time block. Additional information of the length composition of port sampled ocean quahog, and their associated sample sizes by area, are available in the stock assessment reports and data updates.<sup>4</sup>

*Port and Community Description*

When Amendment 13 to the FMP was developed, the Council hired Dr. Bonnie McCay and her associates at Rutgers University to describe the ports and communities that are associated with the surfclam and ocean quahog fisheries. The researchers did an extensive job characterizing the three main fisheries (non-Maine ocean quahog, Maine ocean quahog, and surfclam).

The McCay team characterizations of the ports and communities are based on government census and labor statistics and on observations and interviews carried out during the late 1990s and in the fall of 2001. The description of the fishing gear, areas fished, etc. are fully described in Amendment 13.



**Figure 3. Ocean quahog landings (total and EEZ) during 1965-2020, and preliminary 2021.<sup>4</sup>**

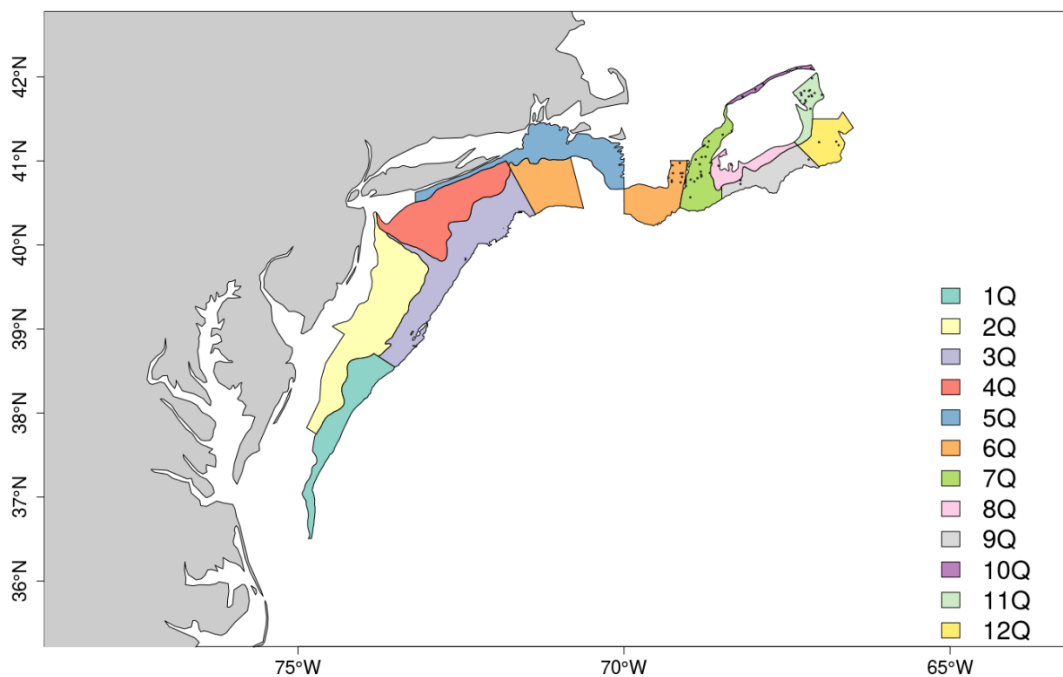
**Table 1. Federal ocean quahog quotas and landings: 1999-2022. SSC determined OFLs and ABCs included.**

Year	OFL (mt)	ABC/ ACL (mt)	EEZ Landings <sup>a</sup> (mt meats)	EEZ Landings <sup>a,b</sup> ('000 bu)	EEZ Quota ('000 bu; excludes 100,000 ME bu)	% Harvested
1999	NA	NA	17,381	3,832	4,500	85%
2000	NA	NA	14,723	3,246	4,500	72%
2001	NA	NA	17,069	3,763	4,500	84%
2002	NA	NA	17,947	3,957	4,500	88%
2003	NA	NA	18,815	4,148	4,500	92%
2004	NA	NA	17,655	3,892	5,000	78%
2005	NA	NA	13,635	3,006	5,333	56%
2006	NA	NA	14,273	3,147	5,333	59%
2007	NA	NA	15,564	3,431	5,333	64%
2008	NA	NA	15,727	3,467	5,333	65%
2009	NA	NA	15,710	3,463	5,333	65%
2010	NA	NA	16,271	3,587	5,333	67%
2011	34,800	26,100	14,332	3,160	5,333	59%
2012	34,800	26,100	15,864	3,497	5,333	66%
2013	34,800	26,100	14,721	3,245	5,333	61%
2014	Not specified	26,100	14,498	3,196	5,333	60%
2015	Not specified	26,100	13,709	3,022	5,333	56%
2016	Not specified	26,100	13,965	3,079	5,333	58%
2017	Not specified	26,100	14,417	3,178	5,333	59%
2018	61,600	44,695	14,606	3,220	5,333	60%
2019	63,600	46,146	11,178	2,464	5,333	46%
2020	63,100	45,783	9,101	2,006	5,333	38%
2021	44,960	44,031	10,246 <sup>c</sup>	2,259 <sup>c</sup>	5,333	42%
2022	45,001	44,072	NA	NA	5,333	NA

<sup>a</sup> Column excludes Maine Landings which have varied from 48-387 mt per year from 1998-2021 (see assessment for additional details on the Maine fishery). <sup>b</sup> 1 ocean quahog bushel is approximately 10 lb. <sup>c</sup> Preliminary, incomplete 2021 data. Source: NMFS clam vessel logbook reports.

Communities from Maine to Virginia are involved in the harvesting and processing of surfclam and ocean quahog. Ports in New Jersey and Massachusetts handle the most volume and value, particularly Atlantic City and Point Pleasant, New Jersey, and New Bedford, Massachusetts. There are also landings in Ocean City, Maryland, and the Jonesport and Beals Island areas of Maine. The small scale Maine fishery is entirely for ocean quahog, which are sold as shellstock for the half-shell market. The other fisheries are industrialized ones for surfclam and ocean quahog, which are hand shucked or steam-shucked and processed into fried, canned, and frozen products.

Additional information on "Snapshots of Human Communities and Fisheries in the Northeast" can be found at: <https://www.nefsc.noaa.gov/read/socialsci/communitySnapshots.php>.



**Figure 4. Ocean quahog stock assessment regions and NEFSC shellfish survey strata. The shaded strata are where quahog are found.**

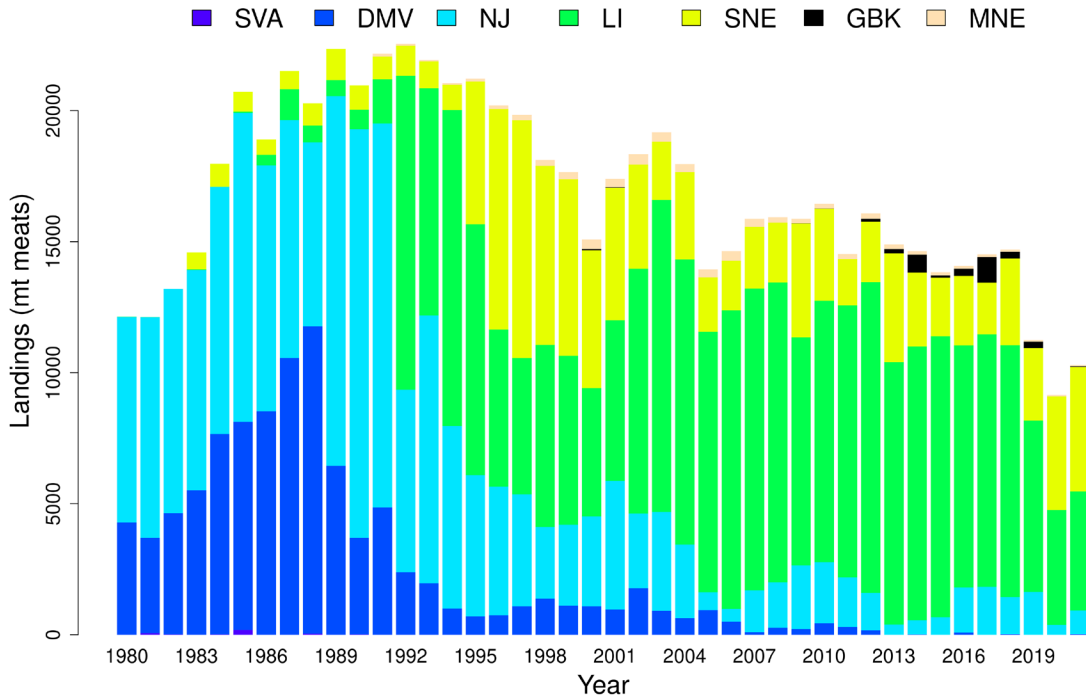


Figure 5. Ocean quahog landings from the US EEZ during 1980-2020, and preliminary 2021.<sup>4</sup>

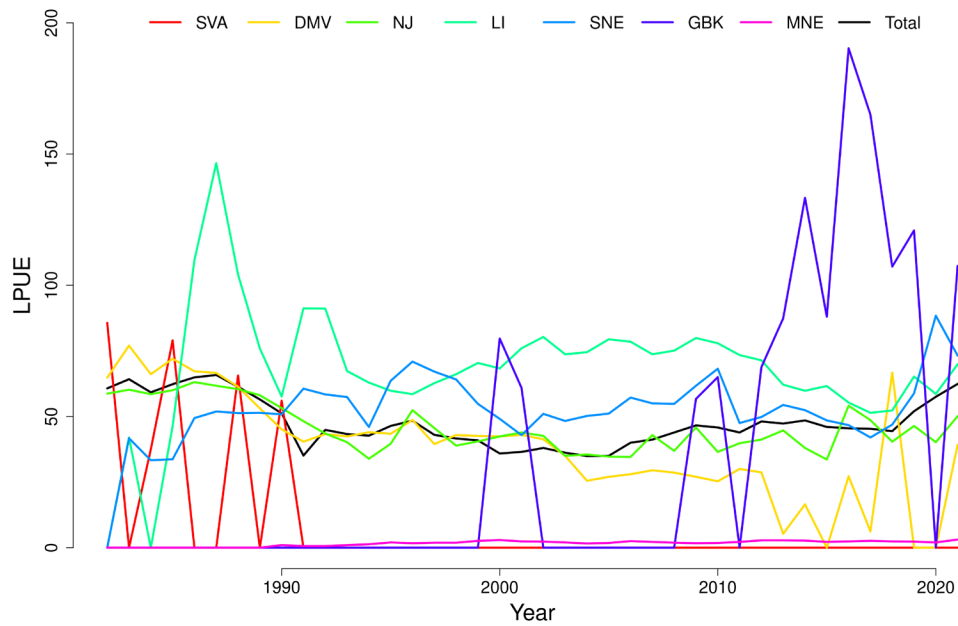
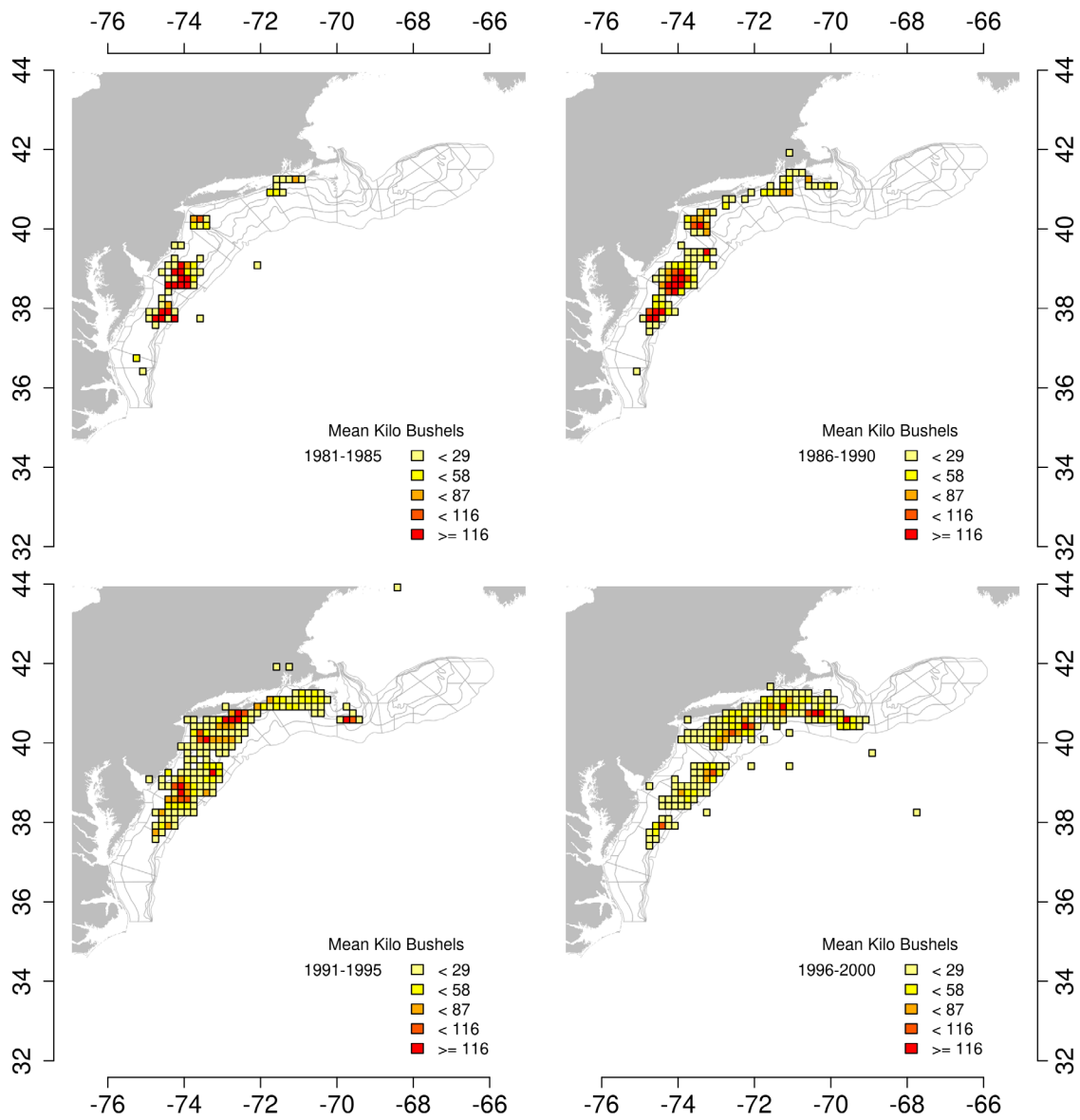
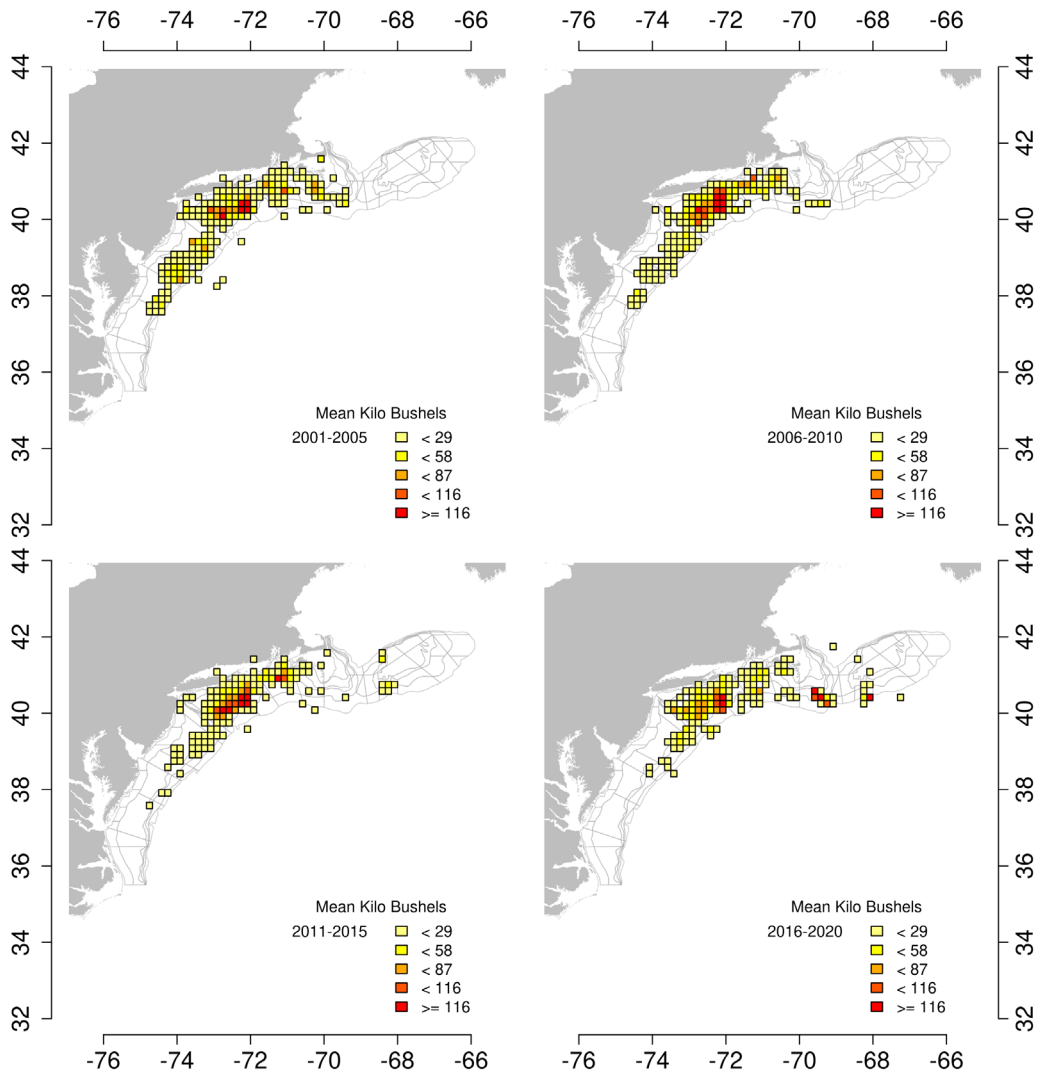


Figure 6. Nominal landings per unit effort (LPUE in bushels landed per hour fished) for ocean quahog, by region, during 1981-2020, and preliminary 2021. LPUE is total landings in bushels divided by total fishing effort.<sup>4</sup>

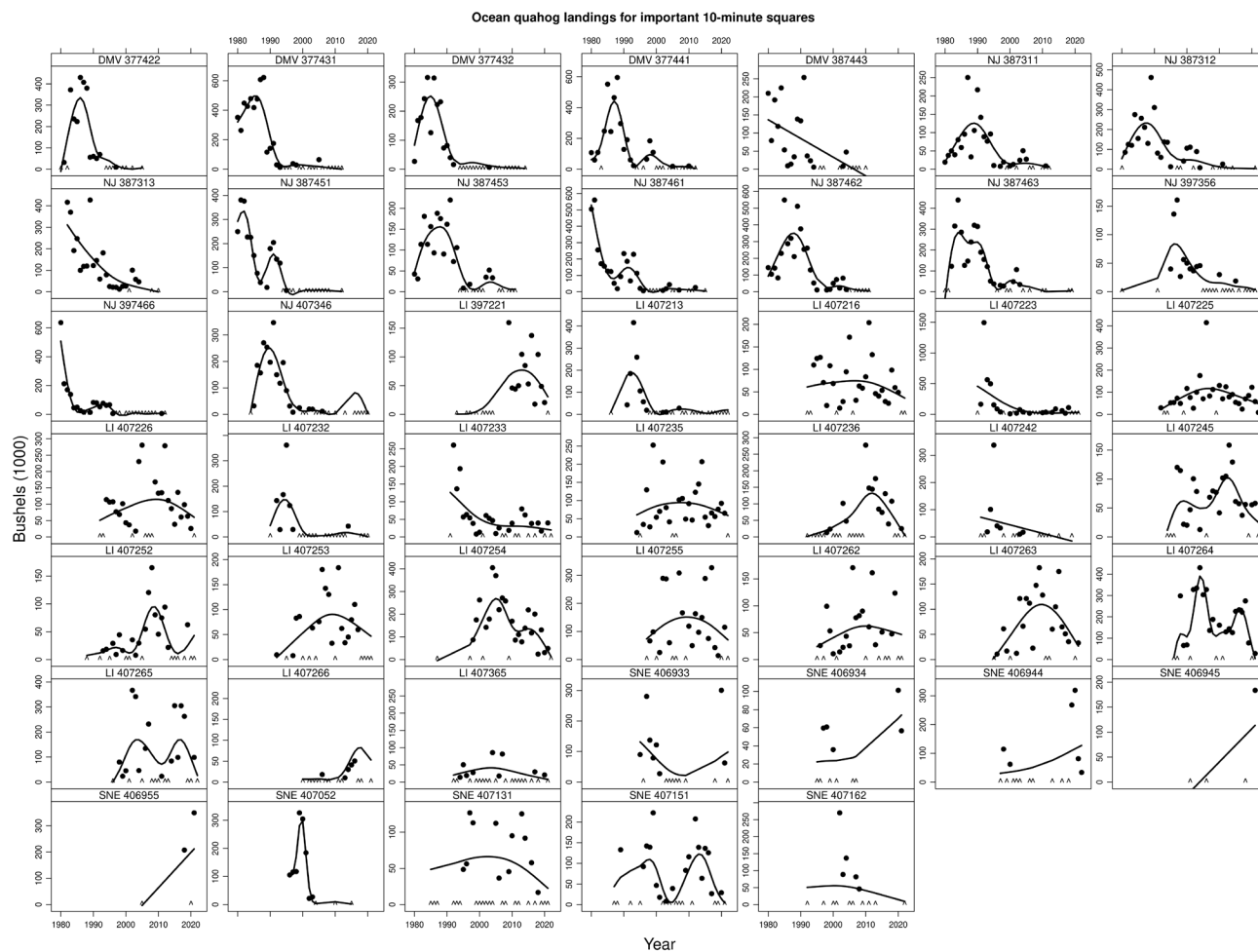




**Figure 7. Average ocean quahog landings by ten-minute squares over time, 1981-2000. Only squares where more the 5 kilo bushels were caught are shown.<sup>4</sup>**



**Figure 8. Average ocean quahog landings by ten-minute squares over time, 2001-2020, and preliminary 2021. Only squares where more the 5 kilo bushels were caught are shown.<sup>4</sup>**



**Figure 9. Annual ocean quahog landings in "important" ten minute squares (TNMS) during 1980-2017 based on logbook data. Important means that a square ranked in the top 10 TNMS for total landings during any five-year period (1980-1984, 1985-1989...). Data for 2021 are incomplete and preliminary. To protect the privacy of individual firms, data are not plotted if the number of vessels is less than 2. Instead, a "A" is shown on the x-axis to indicate where data are missing. The solid dark line is a spline intended to show trends. The spline was fit too all available data, including data not plotted.<sup>4</sup>**

### *Federal Fleet Profile*

The total number of vessels targeting ocean quahog outside of Maine has remained about the same in recent years; with 19 vessels in 2012 increasing to 22 in 2017, then declining to 16 in 2019 (Table 2). The distribution of LPUE in bushels per hour over time for the non-Maine fishery is shown in Figures 6 and 10-11.

The Maine ocean quahog fleet numbers started to decline when fuel prices soared in mid-2008, and a decline in the availability of smaller clams consistent with the market demand (i.e., half-shell market), and totaled 3 vessels in 2021 (Table 2). The average ex-vessel price of non-Maine ocean quahog reported by processors in 2021 was \$7.79 per bushel, slightly lower than the 2020 price (\$7.81 per bushel). In 2021, about 2.3 million bushels of non-Maine ocean quahog were landed, an increase from 2.0 million bushels in 2020. The total ex-vessel value of the 2021 federal harvest outside of Maine was approximately \$18 million, higher than the \$16 million in 2020. In 2021, the Maine ocean quahog fleet harvested a total of 17,387 Maine bushels, a 86% decrease from the 124,839 bushels harvested in 2006, but a slight increase from the prior year (2019; 16,621 bushels). Average prices for Maine ocean quahog had declined substantially over time but have recently show an increasing trend. In 2003, there were very few trips that sold for less than \$37.00 per Maine bushel, and the mean price was \$40.66. Prices have since been lower. In 2021, the mean price was \$39.44 per Maine bushel. The value of the 2021 harvest reported by the purchasing dealers totaled \$0.69 million.

### *Processing Sector*

Even though this document describes the ocean quahog fishery, the information presented in this section regarding the processing sector is for both surfclam and ocean quahog as some of these facilities purchase/process both species.

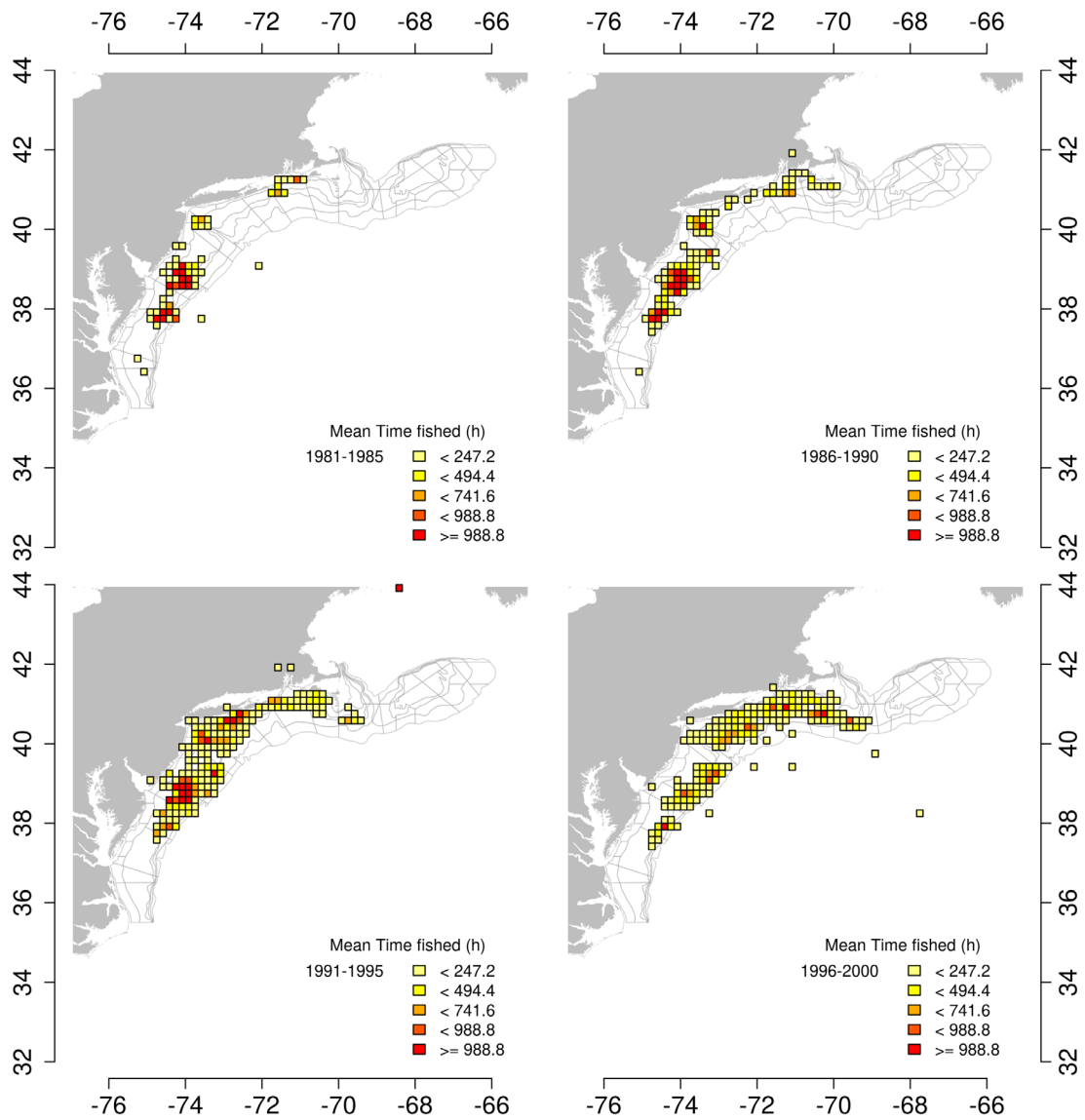
In 2021, there were 8 companies reporting purchases of surfclam and/or ocean quahog in 5 states outside of Maine. Employment data for these specific firms are not available.

In 2021, these companies bought approximately \$24 million worth of surfclam and \$18 million worth of ocean quahog.

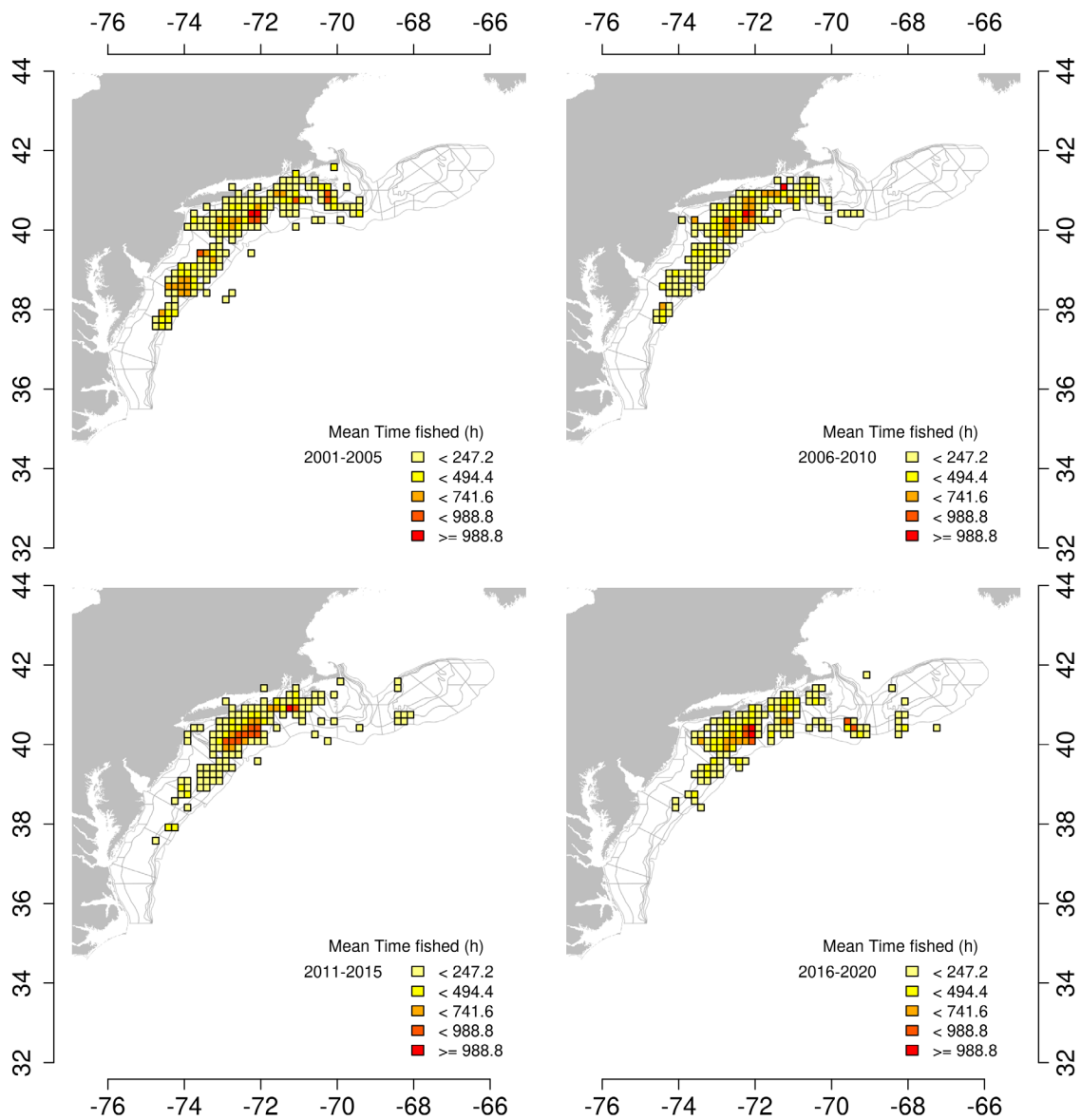
### *Area Closures*

Fishing areas can also be closed for public health related issues due to environmental degradation or the toxins that cause paralytic shellfish poisoning (PSP). PSP is a public health concern for ocean quahog. PSP is caused by saxitoxins, produced by the alga *Alexandrium fundyense* (red tide). Surfclam and ocean quahog on Georges Bank were not fished from 1990 to 2008 due to the risk of PSP. There was light fishing on Georges Bank in years 2009-2011 under an exempted fishing permit and LPUE in that area was substantially higher (5-7 times higher) than in other traditional fishing grounds.

The Greater Atlantic Regional Fisheries Office reopened a portion of Georges Bank to the harvest of surfclam and ocean quahog beginning January 1, 2013 (77 FR 75057, December 19, 2012) under its authority in 50 CFR 648.76. Harvesting vessels must adhere to the adopted testing protocol from the National Shellfish Sanitation Program.



**Figure 10. Average ocean quahog landings per unit effort (LPUE; bu.  $h^{-1}$ ) by ten-minute squares over time, 1981-2000. Only squares where more the 5 kilo bushels were caught are shown.<sup>4</sup>**



**Figure 11. Average ocean quahog landings per unit effort (LPUE; bu. h-1) by ten-minute squares over time, 2001-2020 and preliminary 2021. Only squares where more the 5 kilo bushels were caught are shown.<sup>4</sup>**

**Table 2. Federal fleet profile, 2012 through 2021.**

	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
<b>Non-Maine Vessels Harvesting BOTH surfclam &amp; ocean quahog</b>	12	13	7	7	6	8	14	8	7	10
<b>Non-Maine Vessels Harvesting only ocean quahog</b>	7	6	9	9	10	9	8	8	8	6
<b>Total Non-Maine Vessels</b>	19	19	16	16	16	17	22	16	15	16
<b>Maine Ocean Quahog Vessels</b>	13	12	11	9	8	8	8	8	6	3

Source: NMFS clam vessel logbooks.

### References

1. Cargnelli, L., S. Griesbach, D. Packer, and E. Weissberger. 1999. Essential Fish Habitat Source Document: Ocean Quahog, *Arctica islandica*, Life History and Habitat Characteristics. NOAA Tech. Memo. NMFS-NE-148.
2. Fisheries Science Center. 2017. 63rd Northeast Regional Stock Assessment Workshop (63rd SAW) Assessment Summary Report. US Dept Commer, Northeast Fish Sci Cent Ref Doc. 17-09; 28 p. Available from: National Marine Fisheries Service, 166 Water Street, Woods Hole, MA 02543-1026, or online at <http://www.nefsc.noaa.gov/publications>.
3. Hennen, Dan. Personal Communication. June 14, 2020. NOAA Fisheries, Northeast Fisheries Science Center, 166 Water St., Woods Hole, MA 02543.
4. Hennen, Dan. Personal Communication. March 30, 2022. NOAA Fisheries, Northeast Fisheries Science Center, 166 Water St., Woods Hole, MA 02543.